

Useful non-destructive tissues for the monitoring of metals in crocodylians and the potential of metallothioneins as a biomarker of metal exposure

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Abstract: Although crocodylian caudal scutes have been identified as indicators of metal accumulation, the distribution of metals in other tissues and blood fractions, the potential relationships between organs and keratinized tissues and the response of metal binding proteins remain uncertain. In this study, the distribution of Hg, Cd, Cu and Zn in keratinized tissues, blood fractions, and excretory organs, and MTs in blood fractions and excretory organs was determined in captive, semicaptive, and wild Morelet's crocodiles and they were compared to select the most effective non-destructive tissues for the monitoring of metal exposure and to assess the potential of MTs as a biomarker. Our results indicate blood plasma, claws, and caudal scutes altogether are suitable for the monitoring of xenobiotic metal exposure, with concentrations in blood plasma being an indicator of recent exposure, whereas concentrations in claws and caudal scutes are indicators of chronic exposure. Results in keratinized tissues suggest they are an important detoxification strategy in crocodiles, and foremost, claws presented the highest concentrations of metals in both captive and wild populations. This latter demonstrates that claws are a recommendable tool for assessing metal exposure in populations, especially in those where scutes clipping as a marking technique is not allowed, and their collection is less complicated than with other tissues. MTs are a suitable biomarker in blood plasma, whereas in erythrocytes detoxification processes might depend on hemoglobin, rather than MTs. Future studies should consider the implementation of these tools for the monitoring of wild populations.

Keywords: Metallothioneins, Keratinized tissues, Hemoglobin, Metal detoxification

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